

CLAIMS

1. A method of multicasting a data file, comprising:
 - transmitting a notification on an upcoming multicast transmission to a plurality of receivers designated to receive the multicast transmission;
 - 5 tuning by at least one of the plurality of receivers to one or more multicast channels, responsive to the notification;
 - transmitting a data file, from a data server, on the one or more multicast channels, without the data server receiving acknowledgements from the receivers on whether they 10 received the notification;
 - determining receivers designated to receive the multicast transmission that did not receive at least a portion of the data file; and
 - attempting to deliver the data file to the determined receivers.
- 15 2. A method according to claim 1, wherein transmitting the notification comprises transmitting on a multicast or broadcast channel.
3. A method according to claim 1, wherein transmitting the notification comprises transmitting a unicast notification to each of the receivers on the designated receivers.
- 20 4. A method according to claim 1, wherein transmitting the notification comprises transmitting substantially only to designated receivers.
5. A method according to claim 1, wherein transmitting the notification comprises 25 transmitting a message open also to non-designated receivers.
6. A method according to claim 1, wherein the notification indicates the one or more channels on which the multicast transmission will be provided.
- 30 7. A method according to claim 1, wherein tuning to the multicast channel by at least one of the receivers comprises determining by each receiver that receives the notification whether to tune onto the one or more multicast channels.

8. A method according to claim 7, wherein determining by each receiver that receives the notification whether to tune onto the one or more multicast channels comprises determining, from the notification, a group to which the upcoming multicast transmission belongs and determining whether to tune onto the one or more multicast channels according to the 5 determined group.

9. A method according to claim 7, wherein determining by each receiver that receives the notification whether to tune onto the one or more multicast channels comprises determining by consulting a list stored on the receiver.

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10. A method according to claim 7, wherein determining by each receiver that receives the notification whether to tune onto the one or more multicast channels comprises determining based on input received from a user responsive to the notification.

15 11. A method according to any of claims 1-10, wherein the receivers do not transmit acknowledgements of reception of the notification, at all.

12. A method according to any of claims 1-10, wherein the receivers cannot transmit uplink messages to the data server, without stopping to listen to the one or more multicast 20 channels.

13. A method according to any of claims 1-10, wherein attempting to deliver the data file comprises delivering the data file in a unicast transmission to each of the determined receivers.

25 14. A method according to any of claims 1-10, wherein attempting to deliver the data file comprises delivering the data file in a multicast transmission to a plurality of the determined receivers.

30 15. A method according to any of claims 1-10, wherein attempting to deliver the data file comprises providing a notification message inviting the receivers to download the transmission on a unicast connection, to the determined receivers.

16. A method according to any of claims 1-10, wherein at least 80% of the designated receivers establish only a single unicast connection related to receiving the data file.

17. A method according to claim 16, wherein substantially all of the designated receivers establish only a single unicast connection related to receiving the data file.

18. A method according to claim 16, wherein substantially all of the designated receivers establish up to two single unicast connections related to receiving the data file.

10 19. A method according to any of claims 1-10, wherein at least a portion of the data file is encrypted, requiring one or more decryption keys identified in the transmitted data file.

20. A method according to claim 19, wherein the receivers request the one or more keys after receiving the data file.

15 21. A method according to claim 19, wherein at least one of the receivers requests the one or more keys after receiving the data file and at least one of the receivers is provided with one or more of the keys before the transmission.

20 22. A method according to claim 19, wherein the receivers request the one or more keys after determining that they received sufficient data to allow reconstruction of the data file.

25 23. A method according to claim 19, wherein the keys are received on a single unicast connection along with any supplementary data required, not received during the multicast transmission.

30 24. A method according to any of claims 1-10, comprising receiving acknowledgements from receivers that received the notification or at least a portion of the data file, after transmitting the data file, wherein determining receivers designated that did not receive at least a portion of the data file is performed by determining receivers from which acknowledgments were not received.

25. A method according to claim 24, wherein receiving the acknowledgements comprises receiving a request for decryption keys.

26. A method according to claim 24, wherein receiving the acknowledgements comprises 5 receiving a request for supplementary data not received during the multicast transmission.

27. A method according to claim 24, wherein receiving the acknowledgements comprises receiving over a different network than the network on which the data file was multicast.

10 28. A method according to any of claims 1-10, wherein the data file includes a non-encrypted preview portion.

29. A method according to claim 28, wherein the non-encrypted preview portion is transmitted on the multicast channel interleaved with the remaining portion of the data file.

15 30. A method according to claim 28, wherein at least one occurrence of the non-encrypted preview portion is transmitted on the multicast channel before transmission of the remaining portion of the data file.

20 31. A method according to any of claims 1-10, wherein tuning onto the multicast channel comprises tuning onto a cellular multicast channel.

32. A method according to any of claims 1-10, wherein tuning onto the multicast channel comprises tuning onto a digital video broadcast channel.

25 33. A method according to any of claims 1-10, wherein attempting to deliver the data file to the determined receivers comprises delivering on a different network than the network on which the data file was multicast.

30 34. A method according to any of claims 1-10, wherein the notification indicates a plurality of categories to which the data file relates and the plurality of receivers comprises receivers designated to receive data belonging to different ones of the plurality of categories.

35. A method according to any of claims 1-10, wherein transmitting the data file comprises transmitting a plurality of sub-files in a plurality of separate transmission sessions

36. A method according to any of claims 1-10, wherein transmitting the data file comprises
5 transmitting a plurality sub-files on a plurality of different channels.

37. A method of receiving a data file provided in a multicast transmission, comprising:
tuning, by a mobile station, onto a multicast channel;
receiving at least one encrypted packet which can be used in reconstructing the data
10 file, on the multicast channel; and
receiving at least one key required for decrypting the at least one packet after receiving
the packet.

38. A method according to claim 37, wherein receiving the at least one encrypted packet
15 comprises receiving a plurality of encrypted packets.

39. A method according to claim 38, wherein the plurality of encrypted packets require at
least two different keys for decryption.

20 40. A method according to any of claims 37-39, wherein the at least one key is received
after receiving a sufficient number of packets for reconstructing the data file.

41. A method according to claim 37, comprising requesting the at least one key after
receiving a sufficient number of packets for reconstructing the data file and wherein receiving
25 the at least one key is performed responsive to the requesting.

42. A method according to claim 37, wherein the requesting of the at least one key is
performed responsive to a user instruction.

30 43. A method according to claim 42, wherein at least a portion of the data file is not
encrypted.

44. A method according to claim 43, wherein the user instruction is received after displaying the non-encrypted portion of the file to the user.

45. A method according to claim 44, wherein the non-encrypted portion of the file is 5 received before any encrypted portion of the data file.

46. A method according to claim 45, wherein the user instruction is received before receiving any encrypted portion of the data file.

10 47. A method according to claim 45, wherein the user instruction is received after receiving at least some of the encrypted packets.

48. A method according to claim 37, wherein the file includes a plurality of different portions requiring different keys for decryption.

15 49. A method according to claim 48, wherein the keys required for at least one portion are received after displaying at least one other portion.

50. A method according to claim 49, wherein the keys required for at least one portion are 20 received after displaying at least one other portion which was decrypted.

51. A method according to claim 37, wherein tuning onto the multicast channel is performed responsive to receiving a notification on an upcoming multicast transmission and responsive to a determination that the upcoming multicast transmission matches a subscription 25 profile of the receiver.

52. A method according to claim 51, wherein the determination that the upcoming multicast transmission matches a subscription profile of the receiver comprises consulting a multicast subscription profile stored on the receiver.

30 53. A method according to claim 52, wherein the multicast subscription profile stored on the receiver is configured automatically by instructions from a remote unit.

54. A method according to claim 52, wherein the multicast subscription profile stored on the receiver is configured by a user of the receiver.

55. A method according to claim 37, comprising acknowledging receipt of the at least one 5 key, in a manner which allows charging for the data file.

56. A method of multicasting a file, comprising:
10 encrypting the file using one or more keys;
transmitting the encrypted file to a plurality of receivers in a multicast transmission;
and
providing at least one of the plurality of receivers with one or more decryption keys required for decrypting the transmitted encrypted file, after the file was transmitted.

57. A method according to claim 56, comprising providing at least one of the receivers 15 with at least one decryption key for the encrypted file, before transmitting the encrypted file.

58. A method according to claim 57, comprising receiving from the at least one receivers provided with the decryption keys before transmitting the encrypted file, acknowledgement 20 messages.

59. A method according to claim 58, wherein the acknowledgement messages are received at least 10 minutes after the transmission of the encrypted file is completed.

60. A method according to claim 57, wherein the at least one of the receivers provided with 25 the decryption keys before transmitting the encrypted file are selected at least partially responsive to previous behavior of the receivers.

61. A method according to claim 57, comprising broadcasting in at least one cell, one or 30 more decryption keys of the encrypted file as multicast in the cell, wherein the broadcast decryption keys are encrypted using decryption keys of the file as multicast in one or more other cells.

62. A method according to claim 56, wherein the at least one of the receivers provided with the decryption keys before transmitting the encrypted file are selected at least partially responsive to the number or percentage of acknowledgements provided by the receivers in a given period.

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63. A method according to claim 56, wherein the at least one receivers provided with the decryption keys before transmitting the encrypted file are selected at least partially randomly.

10 64. A method according to claim 56, wherein the at least one receivers provided with the decryption keys before transmitting the encrypted file include all the receivers serviced by at least one base station.

15 65. A method according to claim 56, wherein the number of receivers provided with the decryption keys before transmitting the encrypted file is determined at least partially responsive to the total number of receivers expected to receive the encrypted file.

66. A method of transmitting multicast data, comprising:

20 estimating one or more transmission parameter values required to achieve, on the average, a reception rate of the multicast data lower than 100%, by the receivers to which the multicast data is directed;

transmitting the multicast data on a multicast channel, using the one or more estimated parameter values; and

25 providing at least supplementary portions of the multicast data to receivers that did not receive the multicast data in its entirety in transmitting the multicast data on the multicast channel.

67. A method according to claim 66, wherein providing at least supplementary portions comprises transmitting the supplementary portions over a unicast connection.

30 68. A method according to claim 66, wherein the one or more transmission parameters comprise a transmission power level.

69. A method according to claim 66 or claim 67, wherein the one or more transmission parameters comprise a FEC redundancy level.

70. A method according to claim 66, wherein estimating the one or more transmission parameter values comprises estimating based on general network data without relation to specific conditions of a current transmission.

71. A method according to claim 66, wherein estimating the one or more transmission parameter values comprises estimating based on specific conditions of a current transmission.

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72. A method according to claim 71, wherein estimating the one or more transmission parameter values comprises estimating based on the number of receivers.

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73. A method according to claim 66, wherein the multicast channel comprises a data channel of a cellular network.

74. A method of receiving multicast data in a cellular network, comprising:
establishing, by a mobile station, a data channel, through a first network unit of a first mobile network;

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opening, by the mobile station, a port associated with the data channel; and
receiving, by the mobile station, through the port, multicast data from a multicast channel passing through a second network element, belonging to a second mobile network different from the first mobile network.

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75. A method according to claim 74, wherein establishing the data channel comprises receiving an IP address for the mobile station.

76. A method according to claim 74, wherein establishing the data channel comprises establishing a packet data context.

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77. A method according to claim 74, wherein the first and second network elements comprise gateway GPRS support nodes GGSNs.

78. A method according to claim 74, comprising receiving a key for decrypting the multicast data through the first network element.

79. A method of transmitting multicast data in a cellular network, comprising:

5 providing data for multicast transmission to a plurality of base stations having different bandwidth amounts allocated for multicast transmission, at a same rate;

dropping data by one or more of the base stations, as required, so that the data can be transmitted by each of the base stations on its respective allocated bandwidth for multicast transmission; and

10 transmitting the non-dropped data such that the data is transmitted by all the base stations substantially synchronously.

80. A method according to claim 79, wherein the base stations use a small buffer for the provided multicast data.

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81. A method according to claim 79, wherein providing the data comprises providing data protected with a forward error correction code.

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82. A method according to claim 79, comprising transmitting supplementary data to receivers that request data they did not receive in the multicast transmission over point-to-point connections.

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83. A method of transmitting multicast data in a cellular network, comprising:

transmitting a notification on an upcoming transmission of a multicast file, stating a

plurality of categories to which the data file relates; and

30 tuning on to a multicast channel by a plurality of receivers subscribed to different categories, responsive to the notification.

84. A method of transmitting multicast data in a cellular network, comprising:

35 providing a multimedia file;

splitting the multimedia file into a plurality of portions relating to different media types;

generating for each of the portions at least one sub-file; and

transmitting the plurality of sub-files in respective separate multicast sessions.

85. A method according to claim 84, comprising:

receiving for each of the portions at least one sub-file, by at least one receiver;

5 reconstructing the multimedia file from the received sub-files by the at least one receiver; and

providing the reconstructed multimedia file to an application running on the receiver, which is to provide the multimedia file to a user.

10 86. A method according to claim 84, comprising generating for at least one of the portions a plurality of sub-files in different formats.

87. A method according to claim 84, wherein transmitting the plurality of sub-files in respective separate multicast sessions comprises transmitting on separate multicast channels.

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88. A data server, comprising:

an input interface for receiving files to be multicast;

an output interface for providing signals for transmission to receivers; and

20 a controller adapted to generate a notification on an upcoming multicast transmission responsive to a received file, to provide the notification through the output interface for transmission and to provide the received file for transmission, without receiving acknowledgements from the receivers on whether they received the notification, to determine receivers designated to receive the multicast transmission that did not receive at least a portion of the data file and to attempt to deliver the data file to the determined receivers.

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89. A mobile station, comprising:

a receiver; and

30 a processor adapted to tune the receiver to receive data on a plurality of multicast channels and to combine the data received on the plurality of channels into a single multimedia file.

90. A mobile station according to claim 89, wherein the data received on the plurality of channels comprises different multimedia types on different channels.